PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P200	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/EP2005/002243	International filing date *(day/month/year)* 03.03.2005	Priority date *(day/month/year)* 03.03.2004
International Patent Classification (IPC) or national classification and IPC H01M8/24, H01M8/02		
Applicant IRD FUEL CELLS A/S		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 1 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
03.01.2006	21.03.2006
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Chmela, E Telephone No. +31 70 340-8962

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2005/002243

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-11	as originally filed

Claims, Numbers

2-4	as originally filed
1	received on 09.01.2006 with letter of 03.01.2006

Drawings, Sheets

1/2, 2/2	as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-4
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-4
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-4
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following document:

D1: US6174616 B1

2 NOVELTY

None of the available prior art documents discloses:
-A bipolar separator plate for use in a fuel cell, the separator plate comprising an anterior cathodic flow field, a posterior anodic flow field and two interconnected manifolds for each reactant supply and outflow, for flow of reactants from the anterior cathodic flow field to the posterior anodic flow field and from the posterior anodic flow field to the anterior cathodic flow field.

The subject-matter of independent claim 1 is therefore new (Article 33(2) PCT).

3 INVENTIVE STEP

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1 and shows:
-A bipolar separator plate for use in a fuel cell, said separator plate comprising an anterior cathodic flow field, a posterior anodic flow field (cf. figures 2 and 11 and description c. 5, l. 50-53, the mentioned option of the plate 200 being designed as bipolar implies the flow fields on its opposite sides are respectively an anodic and a cathodic flow field) and manifolds (members 206 and 208 in figure 2, description c. 5, l. 34-54, detailed in figures 8 and 9) for flow of reactants from the anterior cathodic flow field to the posterior anodic flow field and from the posterior anodic flow field to the anterior cathodic flow field;
-two (at least) manifolds for each reactant supply and outflow (cf. c. 13, l. 63-c. 14, l. 16).

The subject-matter of claim 1 differs from D1 in that the two manifolds are interconnected. The technical effect due to this difference is that a uniform supply and outflow of fluids is

maintained even when the fluid is guided by two manifolds and that fluids can be redirected between the manifolds when a part of one manifold is defect.
The problem to be solved by the present invention may be regarded as to provide a bipolar plate for a fuel cell having a more robust flow distribution system.

The solution proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

Although the document D1 mentions the use of multiple manifolds, it dees not hint towards interconnecting these manifolds and teaches away by suggesting that a certain fluid manifold selectively supplies only a subset of fuel cells (cf. c. 13, l. 65-c. 14. l. 5), thus pointing towards segregated guiding of fluids. A skilled person would therefore not be prompted to provide interconnections between the manifolds.

4 DEPENDENT CLAIMS

Claims 2-4 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

CLAIMS

1. A bipolar separator plate for use in a fuel cell, said separator plate comprising an anterior cathodic flow field, a posterior anodic flow field and two interconnected manifolds for each reactant supply and outflow, for flow of reactants from the anterior cathodic flow field to the posterior anodic flow field and from the posterior anodic flow field to the anterior cathodic flow field.

2. The bipolar separator plate of claim 1 wherein the anterior cathodic flow field is at a 90 degree angle with respect to the posterior anodic flow field.

3. The bipolar separator plate of claim 1 wherein an active manifold and a passive manifold are positioned on each edge of the bipolar separator plate.

4. A fuel cell stack comprising two or more separator plates of claim 1, said separator plates being mounted in the fuel cell stack at a 90 degree angle with respect to each other.